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Oxidative stability of roasted and unroasted pumpkin seed oils

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INTRODUCTION & AIM

Health benefits of pumkin seeds oil [1]

Reduces risk of heart disease

Reduces inflamation

Provides overactive bladder relief

Nutritional aid for cancer patients

Good for prostate health

Reduces hypertension in menopausal women

Increases hair growth

The aim of the research was to analyze the oxidative stability of two commercial cold pressed oils from roasted and unroasted pumpkin seeds (*Cuccurbita pepo* L.). The oils came from two different factories located in Poland.

METHOD

- Determination of acid value (AV) and peroxide value (PV) by automatic titrator TitraLab AT1000 Series equipped with a combined pH electrode for titrations in non-aqueous solutions [2] (in AV analysis) and combined electrode with a platinum ring for titration of ORP - oxidation reduction potential [3] (in PV analysis).

- Determination of fatty acid profile by GC method [4] with a flame-ionization detector (FID) and a capillary column with the stationary phase BPX 70; 60 m long, with an internal diameter of 0.25 mm and a film thickness of 0.25 µm. Identification of selected fatty acids was based on comparison of their retention times with standards.

- Determination of induction time by Q20 DSC device equipped with pressure chamber (PDSC – pressure differential scanning calorimeter) at 120, 130, 140°C in oxygen atmosphere (1350–1400 kPa) [5].

- Analysis of melting profile by DSC method at a nitrogen atmosphere under normal pressure in the temperature range from -80 to 80°C (rate - 10°C/min) [5].

RESULTS & DISCUSSION

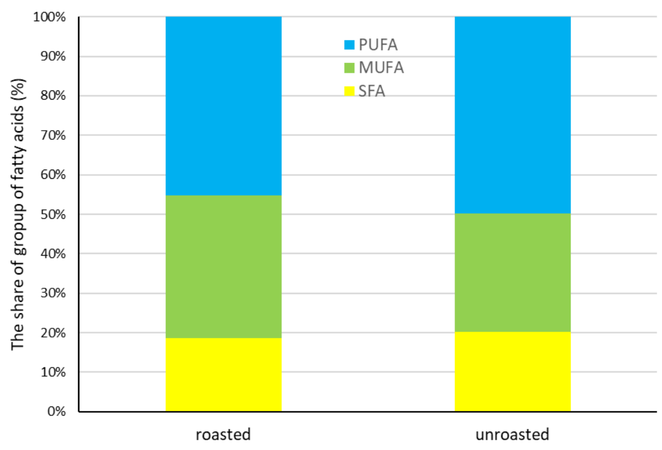

Figure 1. Percentage share of polyunsaturated (PUFA), monounsaturated (MUFA) and saturated (SFA) fatty acid in roasted an unroasted pumpkin seed oil.

In roasted pumpkin seed oil, the total content of SFA was 18.6%. MUFA were present in the amount of 36.14% and PUFA - 45.26%. In unroasted pumpkin seed oil, PUFA were present in the amount of 49.95% and MUFA in the amount of 29.85%. SFA accounted for 20.30%. The process of roasting of pumpkin seeds may have influenced the degradation of unsaturated fatty acids. In oils pressed from pumpkin seeds, linoleic and oleic acids occur in the largest amount. Of the saturated fatty acids, stearic acid is predominant [6].

Oil from roasted pumpkin seeds was also characterized by a lower peroxide value (PV) than oil from unroasted pumpkin seeds. There were no significant differences in the acid value (AV) in roasted and unroasted pumpkin seeds oil. Both, the acid value and peroxide value did not exceed the levels reommended by the Codex Alimentarius for cold-pressed oils: 4 mg KOH/g of fat for acid value and 15 meq O_2/kg of fat for peroxide value [7].

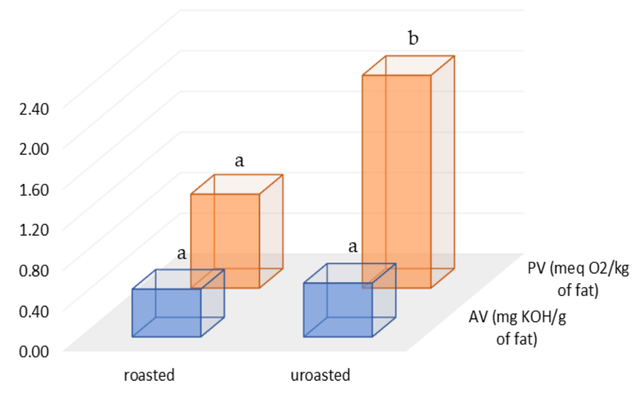

Figure 2. Peroxide value (PV) and acid (AV) value of roasted and unroasted pumpkin seed oil at 120, 130, 140°C.
The different lower case letters indicate significantly different values in AV and PV in roasted and unroasted pumpkin seed oil ($p < 0.05$).

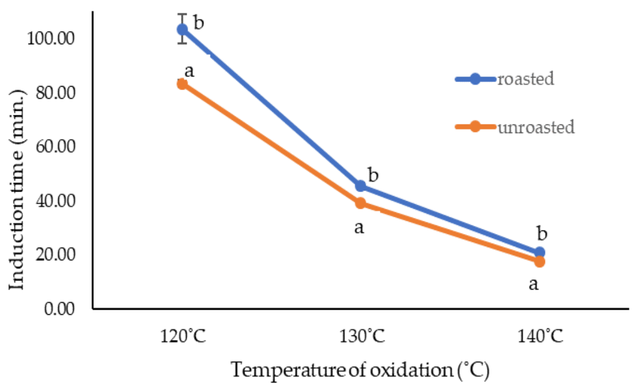

Figure 3. Induction time of roasted and unroasted pumpkin seed oil at 120, 130, 140°C.
The different lower case letters indicate significantly different values in AV and PV in roasted and unroasted pumpkin seed oil ($p < 0.05$).

The presence of peaks mainly at negative temperatures indicates the presence of low-melting fractions containing triacylglycerols with polyunsaturated and monounsaturated fatty acids in the examined fat [5].

At each oxidation temperature, roasted pumpkin seed oil was characterized by statistically significant higher oxidative stability than oil from unroasted pumpkin seeds. The induction time of roasted pumpkin seed oil ranged from 106.61 to 20.90 minutes, while for unroasted pumpkin seed oil the induction time was 83.47 – 17.67 minutes.

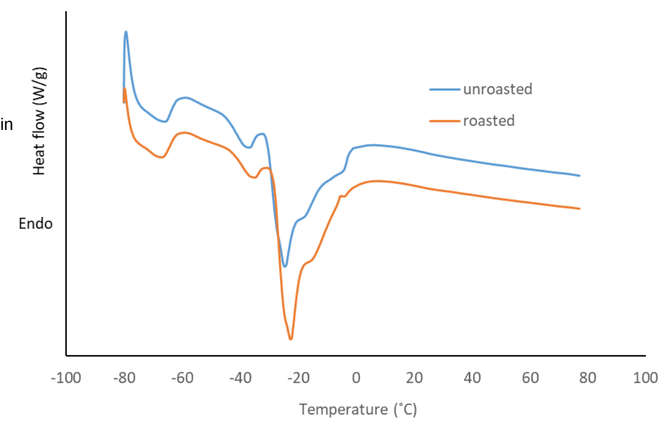

Figure 4. Melting profile of roasted and unroasted pumpkin seed oil.

CONCLUSION

- The use of roasting as a process prior to pressing could affect the degradation of polyunsaturated fatty acids.

- Roasting significantly increased the induction time of pumpkin seed oil. The products of the Maillard reaction, formed during roasting, i.e. melanoidins, which have antioxidant properties, may improve the oxidative stability [8].

FUTURE WORK / REFERENCES

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